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WATER QUALITY MANAGEMENT PLAN for MAINTENANCE DREDGING



**Prepared by
Port of Portland
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1.0 Purpose

The purpose of this Water Quality Management Plan is to describe the activities associated with protection of water quality during maintenance dredging at Port of Portland's (Port's) Marine Terminal 2 and Marine Terminal 5. Maintenance dredging will include:

- dredging sediments above the authorized dredging depth, specified by the permits;
- transport of the dredged material to the Suttle Road Dredged Material Rehandle Facility by barge;
- transfer of the dredged material from the barge into the rehandle facility;
- and discharge of potential excess water from the rehandle facility to the Oregon Slough.

Prior to dredging, the material will be characterized to confirm the suitability for the Suttle Road Rehandle Facility. This plan will be implemented for each maintenance dredging project at Terminal 2 and Terminal 5 in conjunction with the Corps of Engineer's, Division of State Lands, and Oregon Department of Environmental Quality's (DEQ's) permits.

The measures included in this plan are intended to ensure compliance with Section 401 of the Clean Water Act (CWA), and OAR 340-41 certification criteria for Oregon Water Quality Standards. Specifically, this plan outlines a turbidity monitoring and management program for these facilities in the Willamette River Basin, as defined by OAR 340 Division 41. This plan contains the limitations and rationale for an effects-based turbidity approach that is sufficient for protection of beneficial uses and satisfies the requirements for turbidity contained in OAR 340-041-0445. The Section 401 Water Quality Certification is intended to be attached and followed as part of this plan.

2.0 Project Description

Dredging will be accomplished using mechanical (clamshell) methods with material transport in haul barges to the Ports' Suttle Road Dredged Material Rehandle Facility for offload and subsequent beneficial reuse as fill or placement at offsite locations. The Rehandle Facility has a capacity of approximately 25,000 cubic yards. The excess return water that might result from the placement of dredged material in the Rehandle Facility would be discharged to the North Portland Harbor Channel, also known as the Oregon Slough in accordance with State water quality certification requirements. In the event other approved upland dredged material disposal facilities become available during the five-year time frame, the Port may seek authorization to use the additional facilities.

The dredged material placed in the Rehandle Facility for dewatering will be characterized to verify the appropriate management options and final disposition of the material. Following the characterization for final disposition, the dredged material will be removed from the Rehandle Facility to allow restored capacity for future dredging activities. Final disposition of the material is likely to be on Port property.

3.0 Water Quality Monitoring during Maintenance Dredging

This section presents the turbidity thresholds, monitoring requirements, and actions to follow based on monitoring results during maintenance dredging.

3.1 Maintenance Dredging Operations

The Port maintenance dredging operation includes the removal of sediments to a authorized depth from Port Marine Terminals using a closed-lip clamshell bucket from a floating crane. The weight of the bucket allows it in open position to grab sediments from the bottom. The bucket is specifically designed to reduce sediment resuspension into the overlying water column by forming a seal when the bucket is in the closed position and retrieved to the surface. The sediments will be placed in a multi-cell barge or a flat-deck/bin barge with sideboards and multiple cells. A heavy-duty (grizzly) screen with a typical mesh size of 6 to 12 inches is used on the barge to screen the sediments for large debris. The debris would be removed from the screen and stored on the deck or in a separate cell of the barge or on the crane barge for upland disposal.

Dredged material placed in the barge will be retained in the barge. Depending on the cohesiveness of the sediments and the size of the screen, river water may be used to wash the sediments through the screen. In the event excess water is generated during dredging, the water will be retained, or pumped to the shore for proper management. For safety reasons, the sideboards and walking surfaces of the barge may require wash down for personnel working on the barge. Once the barge is full, it would be transported to the Rehandle Facility.

When the contractor estimates that all designated sediments have been removed from the berthing area, a post-dredge survey will be performed to verify that the contracted depth, up to the authorized depth, has been achieved in the berthing area(s). If the post-dredge survey shows areas not yet completed, the contractor will remove those sediments with additional dredging. The final post-dredge survey will be used to calculate the actual river sediment quantities that were removed.

3.2 Turbidity Thresholds

The turbidity thresholds are based on an effects-based approach outlined in the memorandum from Joseph Krieter to Pad Quinn, dated August 30, 2001 (attached). The turbidity thresholds are intended to meet the requirements of OAR Division 41 for the Willamette River Basin.

Turbidity thresholds including action levels and stop-work levels for turbidity monitoring for the Willamette River are listed in Table 1 for dredging activities at Terminal 2 and Terminal 5. Turbidity thresholds for the Columbia River/Oregon Slough are listed in Table 2 for the discharge of excess water from the Rehandle Facility.

Table 1. Turbidity Thresholds for Maintenance Dredging on the Willamette River		
In-water Work Window*	July 1 - Oct 31	Dec 1 – Jan 31
Action Level (NTU)	35	44
Stop-work Level (NTU)	135	144
*Actual work window is set by ODFW and is subject to change		

If unforeseen conditions upriver of the project site elevate background turbidity above the stop-work level, the temporary stop-work level will be 10% above the background turbidity. The monitoring and BMP implementation plan described herein is designed to prevent an exceedance of the turbidity thresholds. An exceedance only occurs when average turbidity is above the action level for a duration of 48 hours or the stop work level for a duration of 8 hours, and dredging has been identified by the monitoring supervisor as the cause of elevated turbidity.

Absent of seasonal acclimation turbidity levels for each river system during the in-water work periods specified above, the action level for a duration of 48-hours is 30 NTU and the stop work level for a duration of 8-hours is 130 NTU. These threshold levels could be used throughout the year in either the Willamette or Columbia Rivers to assure that there would be no detrimental effects to salmonids.

3.3 Monitoring during Dredging

Visual monitoring as well as field-testing of turbidity will take place during dredging. A designated monitoring supervisor will be available during active dredging periods and will ensure that monitoring measurements are recorded in a daily log. Turbidity data recorded in the log will include at a minimum:

- Date and time of measurement;
- Observation location and distance from dredging point;
- Visual condition of turbidity at observation point; and
- Testing results and measuring depth, as tested.

The monitoring program and response to monitoring is illustrated in Figure 1.

3.3.1 Monitoring Location

The compliance point for meeting the turbidity thresholds will be at a distance of 200 feet from the dredging location. Due to tidal fluctuations, the compliance point will be 200 feet both upstream and downstream of the point of dredging. This upstream and downstream compliance point will eliminate the need to determine flow direction each time turbidity is measured.

Visual monitoring will be performed as close to the compliance point as possible from dockside. Water samples for field-testing will also be collected from dockside when

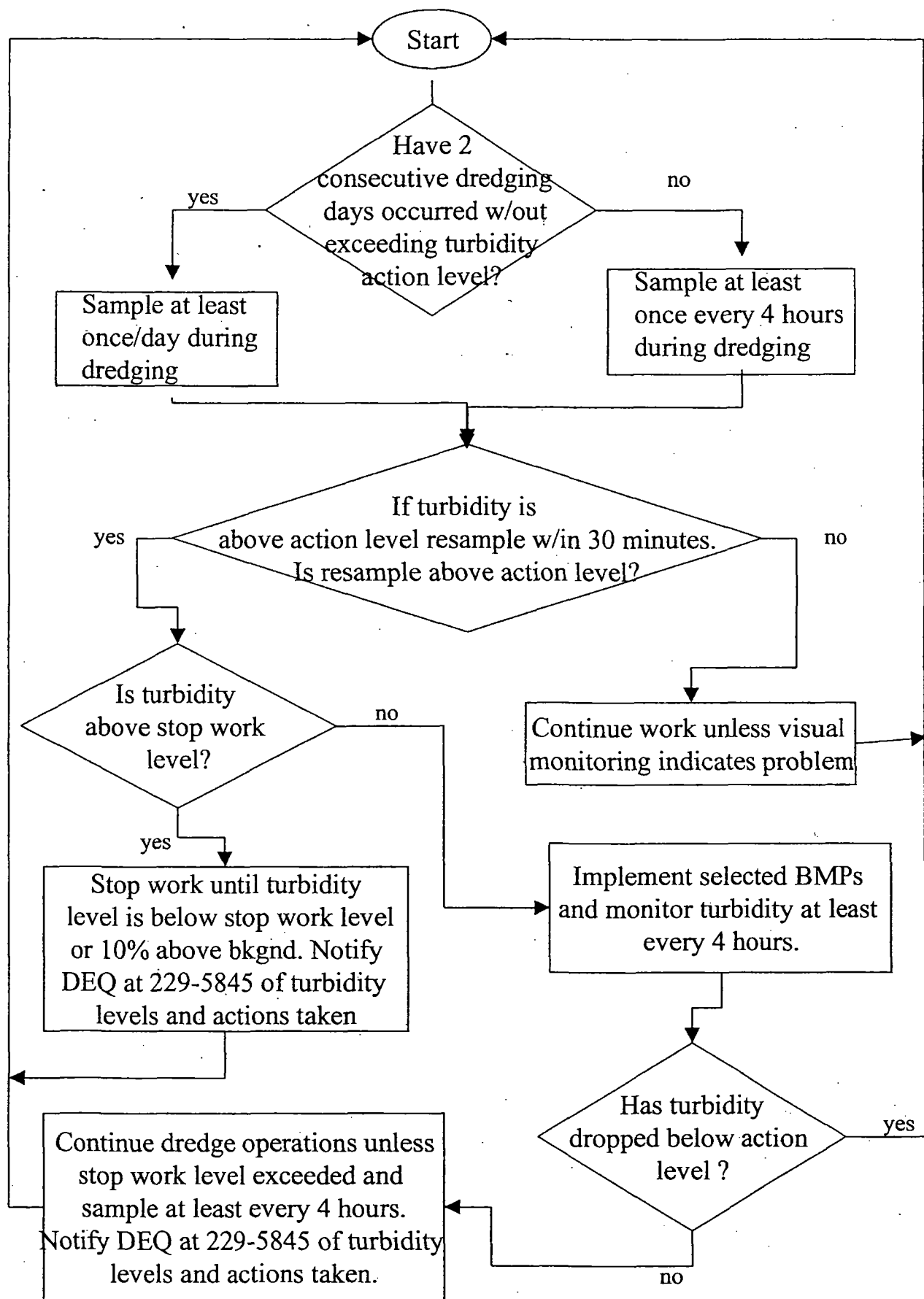


Figure 1. Monitoring and Response to Monitoring during Dredging.

possible. In some cases, water samples will be collected from a boat 200 feet upstream of the dredging and 200 feet downstream of the dredging. Turbidity profile samples will be taken at 20%, 60% and 80% depth. These three turbidity profiles will be averaged to determine the turbidity level.

If unforeseen conditions upriver of the project site elevate background turbidity above the stop-work level, the temporary stop-work threshold level will be 10% above the background turbidity. To measure the control point (or background comparison point), a water sample will be collected from at least 300 feet upstream of the point of dredging. If a control point is required during an incoming tide, the field monitoring supervisor will determine the distance and direction from the dredging to define the background turbidity.

3.3.2 Monitoring Frequency

Visual monitoring of turbidity will occur at least once every 4 hours during dredging operations throughout the entire dredging project.

Field-testing of turbidity will occur at least once every 4 hours during dredging operations of the first two working days of the project and at least once each day thereafter throughout the entire dredging project. If turbidity levels are above the action level and below the stop-work level, monitoring will occur at least once every 4 hours until the turbidity level drops below the action level or dredging is stopped. If the turbidity level is determined to be above the stop-work level and exceeds 10% above the background turbidity dredging will not proceed until the turbidity level has dropped to an acceptable level, or DEQ gives specific approval to proceed.

3.3.3 Meter Calibration

The turbidity meter will be used to monitor turbidity. The meter will be calibrated daily using the factory recommended calibration procedure. At the end of each day of monitoring, a post calibration procedure will be performed by measuring one of the calibration standards (preferable the standard whose value is closest to the river values). In addition, standards may be measured to check the calibration throughout the day, especially if higher or lower than expected turbidity values occur. All calibration procedures and values will be documented.

3.4 Response to Monitoring

If the monitoring supervisor observes turbidity at levels that may be approaching the action level, field-testing will be performed. If field-testing indicates the turbidity level is above the action level, a second sample will be collected within 30 minutes to verify the results. Both measurements must be above the threshold to determine if the turbidity level is above the action level.

If it is determined that the turbidity level is above the action level and below the stop-work level, the dredging contractor foreman may be notified and additional best

management practices (BMPs) will be implemented. Potential BMPs include, but are not limited to:

- Check and repair bucket closure surfaces and containment
- Decrease rate of dredging bucket retrieval
- Don't overfill or underfill bucket
- Pause the loaded dredge bucket at the water surface
- Slow drop-bucket rate
- Don't raise bucket unless bucket fully closed

If all practical BMPs have been implemented and the turbidity continues to be above the action level and below the stop-work level, dredging operations will continue and Tom Melville of the Water Quality Division of DEQ will be notified at 503/229-5845. Notification will include the turbidity level and the actions taken to reduce the turbidity level. Notification can be done by voice mail if Mr. Melville is unavailable.

If it is determined that the turbidity level is above the stop-work level, the dredging contractor foreman will be notified and dredging will be stopped. Mr. Melville of DEQ will be notified at 503/229-5845. Dredging will not be restarted until: (1) the turbidity level drops below the stop-work level; (2) the turbidity level is below 10% of the background turbidity; or (3) DEQ gives special allowance to continue dredging under OAR 340-41-0445 (2) (c).

4.0 Water Quality during Rehandle Operations

This section presents the turbidity thresholds, monitoring requirements, and actions to follow based on monitoring results during operations of the Suttle Road Dredge Material Rehandle Facility.

4.1 Rehandle Facility Operations

Each barge containing dredged material will be transported up the Oregon Slough and anchored near the Rehandle Facility. The dredged material will be transferred into the Rehandle Facility using a pipeline and 10 inch-diameter TOYO submersible agitator-pump. Because the dredged material is intended for upland placement, a project design objective has been to minimize the introduction of water. The agitator pump was designed to operate using material with high solids content and low water content. The lower volumes of water required to operate this specialized pump will allow for less water to manage and reduced dewatering times of the dredged material. The dredged material will already contain inherent water from the dredging operations, however additional water will be required to facilitate pumping of the dredged material.

The TOYO submersible agitator-pump will require 30 to 50% water to operate properly. To achieve this water content, additional water (make-up water) may be introduced to the dredged material. The make-up water will be pumped from the Oregon Slough, in conformance with a state of Oregon Water Resources Department water permit, which includes the requirement of an ODFW and NMFS approved fish screen at the intake. As an alternative, water decanted from the Rehandle Facility may be reused, as described below.

The Rehandle Facility is approximately 5 acres. The facility is divided into two "cells:" the primary dewatering basin, which is approximately 4 acres; and the secondary settling basin, which is approximately 1 acre.

A weir, constructed of a half section of corrugated metal pipe with removable boards, is located between the primary basin and the secondary basin on the west side of the Rehandle Facility. This weir will allow water to be transferred from the primary basin into the secondary basin. The weir boards can be adjusted for water height and settlement time in the primary basin. A second weir of similar construction is located on the east side of the secondary basin. This weir is connected to a discharge pipe and valve that allows water to be discharged into the Oregon Slough.

The dredged material, and any additional river water that is required to operate the agitator pump, will be pumped into the primary basin at the east end. As dredged material is placed into the Rehandle Facility, the material will flow toward the weir on the west side of the Rehandle Facility, which separates the primary basin and the secondary basin. Sediments are expected to settle out within the basin as a function of grain size, distance from the discharge line outfall, and elapsed time within the cell. When enough dredged material is placed into the Rehandle Facility, water will begin to build up against the west weir. As the dredged material flows toward the west weir, the retention time will allow suspended solids to settle.

The secondary basin will remain empty until the material in the primary basin has had ample retention time. Once acceptable conditions are met, the water from the primary basin will be transferred into the secondary basin. Additional retention time will be available as necessary in the secondary basin to meet 401 Water Quality Certification requirements before discharge into the Oregon Slough. This retention time will be predicted using a column settling test of the dredge material collected prior to dredging.

As an optional water management procedure, water from the Rehandle Facility may be recycled and used as make-up water. The east weir has been designed with a manifold to allow the operator to move water from the secondary settling basin and utilize this water to minimize the introduction of additional river water into the unloading process. Water from the secondary basin will be conveyed to the barge for operations of the agitator-pump, rather than discharge to the Oregon Slough. This optional water management procedure can be used to minimize the additional water introduced to the dredge material to operate the agitator-pump.

In order of preference, excess water at the Rehandle Facility will be managed through: (1) infiltration and evaporation, if shown protective through pre-dredge sediment analysis; (2) recycled back to the unloading barge and used as make-up water; and (3) discharged back into the Oregon Slough as permitted by the Water Quality Certification.

4.2 Turbidity Thresholds

The turbidity thresholds are based on an effects-based approach outlined in the memorandum from Joseph Krieter to Pad Quinn, dated August 30, 2001 (attached). The turbidity thresholds are intended to meet the requirements of OAR Division 41 for the Willamette River Basin.

Turbidity thresholds including action levels and stop-work levels for turbidity monitoring for the Willamette River are listed in Table 1 for dredging activities at Terminal 2 and Terminal 5. Turbidity thresholds for the Columbia River/Oregon Slough are listed in Table 2 for the discharge of excess water from the Rehandle Facility.

Table 2. Turbidity Thresholds for discharging from the Suttle Road Rehandle Facility		
Time of Year	Nov 1 – Feb 28	March 1 – Oct 31*
Action Level (NTU)	35	30
Stop-work Level (NTU)	135 and 10% above background	130 and 10% above background
* Absent of seasonal acclimation turbidity levels		

If unforeseen conditions upriver of the project site elevate background turbidity above the stop-work level, the temporary stop-work level will be 10% above the background turbidity.

The monitoring and BMP implementation plan described herein is designed to prevent an exceedance of the turbidity thresholds. An exceedance only occurs when average turbidity is above the action level for a duration of 48 hours or the stop work level for a duration of 8 hours, and dredging has been identified by the monitoring supervisor as the cause of elevated turbidity.

Absent of seasonal acclimation turbidity levels for each river system during the in-water work periods specified above, the action level for a duration of 48-hours is 30 NTU and the stop work level for a duration of 8-hours is 130 NTU. These threshold levels could be used throughout the year in either the Willamette or Columbia Rivers to assure that there would be no detrimental effects to salmonids.

4.3 Monitoring during Discharge from Rehandle Facility to Oregon Slough

Visual monitoring as well as field-testing of turbidity will take place during dewatering return water from the rehandle facility. A designated monitoring supervisor will be available during active discharging periods and will ensure that monitoring measurements are recorded in a daily log. Turbidity data recorded in the log will include at a minimum:

- Date and time of measurement;
- Observation location and distance from dredging point;
- Visual condition of turbidity at observation point; and
- Testing results and measuring depth, as tested.

Elutriate and column settling tests will performed by the Port prior to dredging to predict retention times of water within the Rehandle Facility that meet water quality criteria and Water Quality Certification requirements.

The monitoring program and response to monitoring is illustrated in Figure 2.

4.3.1 Monitoring Location

The compliance point for meeting the turbidity thresholds will be at a distance of 200 feet from the Rehandle discharge point. Due to tidal fluctuations, the compliance point will be 200 feet both upstream and downstream of the point of dredging. This upstream and downstream compliance point will eliminate the need to determine flow direction each time turbidity is measured.

Visual monitoring will be performed as close to the compliance point as possible from landside. Water samples for field-testing will be collected from a boat 200 feet upstream of the discharging and 200 feet downstream of the discharging. Turbidity profile samples will be taken at 20%, 60% and 80% depth. These three turbidity profile will be averaged to determine the turbidity level. If it is determined that the turbidity requirements are being met 200 feet from the discharge point, samples for field-testing may be collected at the inlet of the secondary basin weir. If turbidity requirements are met at the inlet of the weir, there is assurance that turbidity requirements will be met 200 feet from the outlet of the pipe.

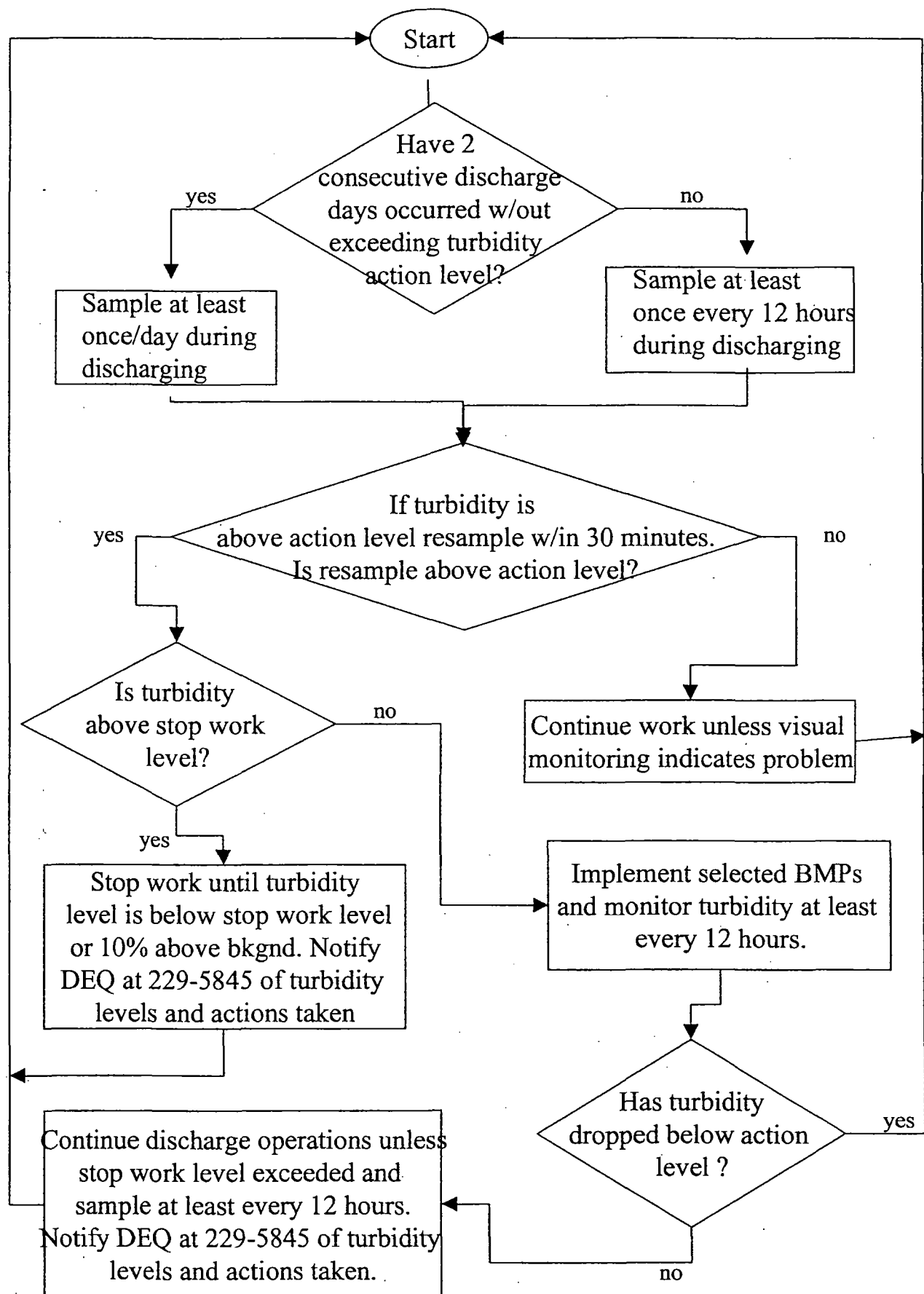


Figure 2. Monitoring and Response to Monitoring during Discharge from Rehandle Facility.

If unforeseen conditions upriver of the project site elevate background turbidity above the stop-work level, the temporary stop-work threshold level will be 10% above the background turbidity. To measure the control point (or background comparison point), a water sample will be collected from at least 300 feet upstream of the point of dredging. If a control point is required during an incoming tide, the field monitoring supervisor will determine the distance and direction from the dredging to define the background turbidity.

4.3.2 Monitoring Frequency

Visual monitoring of turbidity will occur at least once every 12 hours during discharge from the Rehandle Facility to the Oregon Slough.

Field-testing of turbidity will occur at least once every 12 hours during discharge operations of the first two working days of the project and at least once each day thereafter. If turbidity levels are above the action level and below the stop-work level, monitoring will occur at least once every 12 hours until the turbidity level drops below the action level or dredging is stopped. If the turbidity level is determined to be above the stop-work level and exceeds 10% above the background turbidity discharging will not proceed until the turbidity level has dropped to an acceptable level, or DEQ gives specific approval to proceed.

4.3.3 Meter Calibration

The turbidity meter will be used to monitor turbidity. The meter will be calibrated daily using the factory recommended calibration procedure. At the end of each day of monitoring, a post calibration procedure will be performed by measuring one of the calibration standards (preferable the standard whose value is closest to the river values). In addition, standards may be measured to check the calibration throughout the day, especially if higher or lower than expected turbidity values occur. All calibration procedures and values will be documented.

4.4 Response to Monitoring

If the monitoring supervisor visually observes turbidity at levels that may be approaching the action level, field-testing will be performed. If field-testing indicates the turbidity level is above the action level, a second sample will be collected within 30 minutes to verify the results. Both measurements must be above the threshold to determine if the turbidity level is above the action level.

If it is determined that the turbidity level is above the action level and below the stop-work level, the Rehandle Facility Operator may be notified and additional best management practices (BMPs) will be implemented. Potential BMPs include, but are not limited to:

- Decrease the water flow over the weir;
- Place sediment collection device at the inlet of the discharge pipe;
- Increase detention time of the dredged material in the secondary basin.

If all practical BMPs have been implemented and the turbidity continues to be above the action level and below the stop-work level, discharging operations will continue and Tom Melville of the Water Quality Division of DEQ will be notified at 503/229-5845.

Notification will include the turbidity level and the actions taken to reduce the turbidity level. Notification can be done by voice mail if Mr. Melville is unavailable.

If it is determined that the turbidity level is above the stop-work level, the Rehandle Facility Operator will be notified and discharge for the Rehandle Facility to the Oregon Slough will be stopped. Mr. Melville of DEQ will be notified at 503/229-5845. Dredging will not be restarted until: (1) the turbidity level drops below the stop-work level; (2) the turbidity level is below 10% of the background turbidity; or (3) DEQ gives special allowance to continue dredging under OAR 340-41-0445 (2) (c).

5.0 Additional Water Quality Protection Measures for Dredging and Rehandle Operations

To protect the waters of the State of Oregon and ensure Clean Water Act and State Water Quality standards are met, particularly OAR 340-41-026 (1)(a), Antidegradation Policy for Surface Waters, the following guidance is included:

This reach of the Willamette River is classified as Water Quality Limited under Section 303(d) of the Federal Clean Water Act for the following parameters: Bacteria [Fecal coliform (Fall-Winter-Spring)]; Toxics: [Tissue-Mercury (Year Round)]; Toxics [Tissue/Sediment- Pentachlorophenol, Arsenic]; Temperature (Summer); and Biological Criteria (Fish Skeletal Deformities).

This reach of the Willamette River supports salmonid rearing and migration.

- 1) **Fish protection/ODFW timing :**
 - a) All in-water work shall occur within the Oregon Department of Fish and Wildlife's (ODFW) agreed upon in-water work window specific to this project.
 - b) Ensure that no obstruction or impediments to fish passage, nor other detrimental impacts to fish, occur as a result of maintenance dredging activities.
- 2) The Port of Portland will implement this turbidity monitoring and management program. The turbidity monitoring and management program covers all dredging and discharging operations for the 5-year duration of the water quality certificate and includes the following elements:
 - Threshold turbidity levels based on fish effects data,
 - Threshold turbidity level response implementations and procedures,
 - Monitoring frequency and locations,
 - Baseline Best Management Practices (BMPs) to be implemented,
 - Additional BMPs that will implement as a result of an exceedance in the turbidity threshold levels.
- 3) If maintenance dredging operations cause a water quality problem which results in distressed or dying fish, the Port shall immediately: cease operations; take appropriate corrective measures to prevent further environmental damage; collect fish specimens and water samples; and notify DEQ and the Oregon Department of Fish and Wildlife (ODFW).
- 4) Petroleum products, chemicals, or other deleterious waste materials shall not be allowed to enter waters of the State.

- 5) Fuel hoses, oil drums, oil or fuel transfer valves and fittings, etc., shall be checked regularly for drips or leaks, and shall be properly maintained in order to prevent spills into State waters.
- 6) In the event of reportable releases of oil, fuel, or other hazardous materials into State waters, or onto land with a potential to enter State waters, the DEQ Spill Response Team [Northwest Region/Portland: (503) 229-5263] shall be contacted, and containment and cleanup shall begin immediately and be completed as soon as possible (OAR 340-047-0100).
- 7) This Water Quality Monitoring Plan shall remain in effect during the term of the maintenance dredging permits which requires this plan. DEQ reserves the option to modify, amend or revoke this Plan, as necessary, in the event new information indicates that the maintenance dredging/discharge activities are having a significant adverse impact on State water quality or critical fish resources.
- 8) A copy of this Plan shall be kept on the job site and readily available for reference by the Corps of Engineers, DEQ personnel, the contractor, and other appropriate state and local government inspectors.
- 9) This Plan is invalid if the project is operated in a manner not consistent with the project description contained in the Public Notice for certification.
- 10) DEQ will be provided site access on day of request.

6.0 Reporting

A Water Quality Monitoring report will be submitted to the DEQ after the completion of the maintenance dredging and dewatering activities at the Suttle Road Rehandle Facility. The report will include a summary of visual turbidity monitoring; a summary of field testing results, including any exceedances of the action level as listed above; variations to this plan; and recommendations or changes to this plan for any future maintenance dredging activities under this permit.